SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

AMS 4078G

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Superseding AMS 4078F

Aluminum Alloy Plate
(7075-T7351)
Solution Heat Treated, Stress Relieved, and Overaged

(Composition similar to UNS A97075)

RATIONALE

AMS 4078G results from a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of plate.

1.2 Application

This plate has been used typically for machined parts subject to excessive warpage during machining due to residual stresses and for parts requiring high strength and resistance to stress-corrosion cracking, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970, www.sae.org.

AMS 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials
AS1990	Aluminum Alloy Tempers

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B 594	Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications
ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum Products

2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036, Tel: 212-642-4900, www.ansi.org.

ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2M	Dimensional Tolerances for Aluminum Mill Products (Metric)

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355.

TABLE 1 - COMPOSITION

Element	min	max
Silicon	--	0.40
Iron	--	0.50
Copper	1.2	2.0
Manganese	--	0.30
Magnesium	2.1	2.9
Chromium	0.18	0.28
Zinc	5.1	6.1
Titanium	--	0.20
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Solution heat treated, stretched to produce a nominal permanent set of 2%, but not less than 1-1/2% nor more than 3%, and precipitation heat treated to T7351 temper (see AS1990); heat treatment shall be performed in accordance with AMS 2772.

3.2.1 Plate shall receive no straightening operations after stretching.

3.3 Properties

Plate shall conform to the following requirements, determined in accordance with AMS 2355 on the mill produced size:

3.3.1 Tensile Properties

Shall be as specified in Table 2.

TABLE 2A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Over 0.250 to 1.000, incl	69.0	57.0	7
Over 1.000 to 2.000, incl	69.0	57.0	6
Over 2.000 to 2.500, incl	66.0	52.0	6
Over 2.500 to 3.000, incl	64.0	49.0	6
Over 3.000 to 3.500, incl	63.0	49.0	6
Over 3.500 to 4.000, incl	61.0	48.0	6

TABLE 2B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Over 6.35 to 25.40, incl	476	393	7
Over 25.40 to 50.80, incl	476	393	6
Over 50.80 to 63.50, incl	455	359	6
Over 63.50 to 76.20, incl	441	338	6
Over 76.20 to 88.90, incl	434	338	6
Over 88.90 to 101.60, incl	421	331	6

3.3.2 Corrosion Resistance

Resistance to stress corrosion cracking and to exfoliation-corrosion shall be acceptable if the plate conforms to 3.3.2.1 or 3.3.2.2.

3.3.2.1 If electrical conductivity is not lower than 40.0% IACS (International Annealed Copper Standard) (22.0 MS/m), determined on the surface of specimens used for tensile testing.

3.3.2.2 If electrical conductivity is 38.0 to 39.9% (22.0 to 23.1 MS/m) inclusive, and yield strength does not exceed the specified minimum by more than 11.9 ksi (82 MPa).

3.3.2.3 If the requirements of 3.3.2.1 or 3.3.2.2 are not met, the plate may be given additional precipitation heat treatment or re-heat treated. If, after such treatment, all specified properties are met, the plate is acceptable.

3.3.2.4 If the conductivity is below 38.0% IACS (22.0 MS/m), the product is not acceptable and must be reprocessed, regardless of tensile properties.

3.3.3 Stress-Corrosion Resistance

Specimens cut from plate 0.750 inches (19.05 mm) and over in nominal thickness shall show no evidence of stress-corrosion cracking when stressed in the short-transverse direction to 75% of the applicable minimum yield strength specified in 3.3.1.

3.4 Quality

Plate, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the plate.

3.4.1 When specified, each plate 0.500 inch (12.70 mm) and over in nominal thickness shall be ultrasonically inspected in accordance with ASTM B 594 and shall meet the requirements of 3.4.1.1 as applicable.

3.4.1.1 Plates weighing 2000 pounds (907 kg) and under shall meet the requirements for ultrasonic class shown in Table 3.

TABLE 3 - ULTRASONIC CLASS

Nominal Thickness Inches	Nominal Thickness Millimeters	Ultrasonic Class
Over 0.500 to 1.500, excl	Over 12.70 to 38.10, excl	B
Over 1.500 to 3.000, incl	Over 38.10 to 76.20, incl	A
Over 3.000 to 4.000, incl	Over 76.20 to 101.60, incl	B

3.5 Tolerances

Shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of plate shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the plate conforms to specified requirements.

4.2 Classification oF Tests

4.2.1 Acceptance Tests

Composition (3.1), tensile properties (3.3.1), conductivity (3.3.2), tolerances (3.5), and, when specified, ultrasonic soundness (3.4.1) are acceptance tests and, except for composition, shall be performed on each lot.

4.2.2 Periodic Tests

Stress-corrosion resistance (3.3.3) is a periodic test and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS 2355.

4.4 Reports

The vendor of product shall furnish with each shipment a report stating that the product conforms to the composition, tolerances and NDT inspection, when required, and showing numerical results of tests for the other acceptance test requirements and periodic test requirements when performed. This report shall include the purchase order number, inspection lot number(s), AMS 4078G, size, and quantity. The report shall also identify the producer, the product form, and the size of the mill product.

4.5 Resampling and Retesting

Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY